

# Comparison of early and late closure of transverse loop colostomies

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## Summary

A retrospective study was made from the records of 100 consecutive patients who had closure of a temporary transverse colostomy at Addenbrooke's Hospital, Cambridge, between 1969 and 1982. Thirtyeight colostomies were closed early, approximately 2 weeks after the initial bowel resection and during the same hospital admission. The closure technique in the majority of cases involved resecting the bowel ends and performing a single layer anastomosis with interrupted Supramid.

Statistically there was no difference in overall or individual complications, such as faecal fistulae and wound infections, in the early compared with the late colostomy closure group. The length of stay in hospital after closure was almost identical in both groups. This is true despite a higher proportion of operations in the early closure group being performed by less experienced surgeons.

Early closure of a temporary colostomy is a relatively safe procedure and has obvious advantages for rehabilitation.

## Introduction

The possibility of closing a temporary colostomy within 3 weeks of the primary bowel resection rather than after the traditional 6 weeks has many attractions. The effluent of a right transverse colostomy is often malodorous and loose, sometimes causing excoriation of the surrounding skin. The siting of the colostomy may not be ideal, particularly in the obese, making it difficult for the patient to see the stoma. These factors together with the age of the patient, possible arthritis of the fingers and poor eyesight may make adaptation to life with a stoma difficult. As a result the hospital stay may be prolonged whilst the patient learns to manage the colostomy and considerable support from the community services is necessary once the patient has returned home.

Henry and Everett (1) assessing factors associated with a favourable outcome of loop colostomy closures concluded that even when closed before 6 weeks no major complications resulted from either fistulae or infection.

In this paper early and late colostomy closures were assessed in more detail by comparing the post-closure complication rates and length of hospital stay. It shows that early closure of transverse colostomies is a relatively safe procedure.

## Patients and methods

Early closure was defined as closure of the colostomy within 3 weeks of the primary bowel resection. All early closures were performed during the same hospital admission, the majority 2 weeks after the initial operation.

The records of 100 consecutive patients who had a temporary transverse loop colostomy closed between 1969 and 1982 were studied. All the operations were performed in Addenbrooke's Hospital, Cambridge, by one surgical firm specialising in colo-rectal surgery. The majority of colostomies had been formed as part of a staged procedure in the management of distal colonic disease. Before colostomy closure the distal anastomosis was checked in all patients by means of a limited barium enema. An intraperitoneal technique for colostomy closure was used with resection of the bowel ends. In over 80% of patients a one layer anastomosis was carried out using interrupted sutures of Supramid. In the remainder the anastomosis was performed in two layers with continuous chronic catgut and interrupted Supramid. A corrugated drain was placed down to the suture line and brought out through the incision.

An analysis of the patients is shown in Table I.

There was a total of 38 early closures, all for carcinoma of the colon or rectum. The complication rates and length of hospital stay following early and late closure were assessed. An analysis of the reasons for delayed closure was also made to try and identify factors in the development of postclosure complications.

The  $\chi^2$  and Fisher exact probability tests were used for statistical analysis of the results.

TABLE I Patient analysis

Average age	63.9 years	(S.D. 11.9)
Male:Female ratio	1:0.8	(56:44)
Early:Late ratio	1:1.6	(38:62)
Consultant:Registrar ratio	1:1.2	(45:55)
Diagnosis		
Colo-rectal cancer	n = 82	
Diverticulitis	n = 15	
Miscellaneous	n = 3	
	100	

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## Results

### POSTCLOSURE COMPLICATION RATE

The postoperative course was uneventful in 85% of patients. Eighteen complications occurred in the remaining 15%; 3 patients having more than one complication. These were, death 2; faecal fistula 10; wound infection 5; other 1. There was no case of deep vein thrombosis or pulmonary embolism.

The 2 patients who died had late colostomy closures and developed faecal fistulae. A 76 year old man with malignant disease developed a faecal leak from the colostomy site 12 days postclosure which did not resolve and he died 26 days later. The other patient was a 66 year old man who underwent resection of diverticular disease for a colo-vesical fistula and paracolic abscess. Following surgery the wound broke down and delayed closure of the colostomy. This was eventually performed 7 weeks later together with repair of an incisional hernia. Five days after colostomy closure he developed faecal peritonitis due to breakdown of the primary colonic anastomosis. An emergency Paul-Mikulicz procedure was performed but the patient died six days later from bronchopneumonia.

Faecal fistulae developed from the colostomy site in 7 patients, from the distal anastomosis in 1, and from both sites in 2 patients. Eight resolved spontaneously with conservative management. The incidence of faecal fistula formation from the colostomy closure site was therefore 9%. All these patients were assumed to have concurrent wound infection, defined as the discharge of pus from the wound or a positive culture. One patient developed a small pancreatic fistula, as the resected carcinoma involved part of the pancreas.

### FACTORS INFLUENCING MORBIDITY AND MORTALITY OF COLOSTOMY CLOSURE

The complications were analysed with respect to early and late colostomy closure and are shown in Table II.

Statistically there was no increase in either the overall or individual complication rates such as faecal fistulae and wound infection in early compared with late colostomy closure. In fact, the complication rate was slightly lower in the early group (16% compared with 19%).

There was only one complication, a wound infection, in the 45 colostomies closed by the consultant (complication rate 2%) compared with 14 complications in 55 colostomy closures performed by registrars (complication rate 26%). This is statistically significant ( $P = 0.0008$ ).

A higher proportion of the early colostomy closures were performed by registrars (consultant 15, registrars 23) than late closures (consultant 30, registrars 32).

The individual complication rates for two-layer closures was two to three times the rate for single-layer closures (37% against 14%). However 17 of the 19 two-layer closures were performed by registrars.

There was no significant difference in morbidity when colostomies were closed by registrars in one or two layers. There were 9 complications in 38 single-layer closures and 5 complications in 17 two-layer closures.

Only one of 15 patients with complications had diverticular disease, all the remainder had large bowel neoplasms. As there were fewer patients in the series with diverticular disease, this was not statistically significant.

TABLE III The average number of days in hospital postclosure

	Patients with no postclosure complications	Patients with postclosure complications	Average
Early closure	9.6 (S.D. 3.2)	14.1 (S.D. 3.0)	10.3
Late closure	9.5 (S.D. 3.7)	16.0 (S.D. 3.0)	10.8

### ANALYSIS OF DAYS IN HOSPITAL POSTCLOSURE (Table III)

The average number of days in hospital after closure was almost identical for early and late closures but was increased in cases with postclosure complications.

### ANALYSIS OF REASONS FOR DELAYED CLOSURE

Patients who had their colostomies closed more than 3 weeks after bowel resection fell into 4 broad categories.

In the vast majority (42 cases) closure was delayed because of complications of the original resection. Sixteen patients had complicated procedures, including operations for diverticular disease and emergency surgery for intestinal obstruction. In 9 cases another medical condition intervened and in 9 no reason was given. Many patients had more than one reason for delayed closure.

### RISK FACTORS PREDISPOSING TO POSTCLOSURE COMPLICATIONS

Twentyone per cent of patients with primary resection complications developed complications after colostomy closure. Compared with other late closure patients this is statistically higher ( $P = 0.022$ ).

The significant risk factors were multiple complications with faecal fistulae (60% developed postclosure complications,  $P = 0.025$ ) and wound and other infections (38%,  $P = 0.016$ ). A technically complicated first operation, leak on barium enema and thrombo-embolic phenomena did not significantly increase the risk of postclosure complications.

## Discussion

This paper compares two substantial groups, early and late colostomy closures, in which the same technique was used in the majority of cases. Although it could be argued that two dissimilar groups are being compared all patients were considered fit at the time of colostomy closure. If either group was at a disadvantage this is likely to be the early closure group where the surgery was technically more difficult and the risk of pulmonary embolus or deep vein thrombosis greater.

We conclude that there is no increase in morbidity or mortality in the early closure group when tested using statistical methods. The significant risk factor in the early closure group was a higher proportion of less experienced surgeons ( $P < 0.005$ ). In the late closure group there was a higher proportion of post resection faecal fistulae and wound infections ( $P < 0.05$ ).

There is at present much dispute about the safety of early closure. Indeed in other series early closure has been defined as closure before 1 or even 3 months.

Our results support a recent paper by Lewis and Weedon (2) who carried out a prospective study of 60 patients undergoing colostomy closure within one month, using antibiotic cover and a single-layer technique. The faecal fistula rate was 6.7%, wound infection rate 10% and series

TABLE II Analysis of complications

		Death	Faecal fistula	Wound infection	Other	Total complications
Early closure	$n = 38$	—	4 (11%)	1 (3%)	1 (3%)	6 (16%)
Late closure	$n = 62$	2 (3%)	6 (10%)	4 (6%)	—	12 (19%)
Total	$n = 100$	2 (2%)	10 (10%)	5 (5%)	1 (1%)	18 (18%)

complication rate 18.3%. They concluded that the rehabilitation of elderly patients after major colorectal surgery was thus facilitated and the avoidance of readmission for colostomy closure resulted in saving time and resources. There was not however a comparable late closure group. Finch (3) and Anderson *et al.* (4) found the timing of colostomy closure had no apparent bearing on the incidence of complications.

This sparked off a lively debate (5) because Thomson and Hawley (6) and Wheeler and Barker (7) had previously advocated that colostomy closure within 1 month of its construction should be undertaken with caution and was best avoided. In 1972 Thomson and Hawley published a review of 139 patients from St Mark's Hospital in which the incidence of faecal fistulae was only 2.9%. All 4 of these fistulae occurred among the 38 colostomies closed before 1 month, a result which was significant. They also found a significant increase in wound infections in the early closure group.

Two possible hypotheses have been put forward, the technical difficulty of early closure due to the presence of inflammatory oedema and delayed healing because of collagen lysis in the gut following colonic surgery. More recent authors dispute these results (2-4).

Our series complication rate of 15% was slightly better than most. A review of 1676 colostomy closures reported by Samhoury and Grodsinsky (8) showed a complication rate of 29.6%. The incidence of faecal fistulae varied from 0 to 23% with an average of 11%. This compares with our result of 9%.

Surgical experience is perhaps the single most important factor in avoiding complications of colostomy closure and this has been stressed by Henry and Everett (1) and Wheeler and Barker (7). The incidence of faecal fistulae in the St Mark's series (6) was only 2.9% compared with a reported incidence of 23% from Exeter District General Hospital (9). In our own series there were no fistulae in the 45 colostomies closed by the consultant but 10 occurred in the 55 patients operated on by registrars.

The influence of underlying pathology on postclosure morbidity is disputed. Our series supports Lewis and Weedon (3) and Wheeler and Barker (7) who found no statistical differences relating disease process to morbidity. Thomson and Hawley (6) and Henry and Everett (1) suggested that bowel carcinoma predisposed to postclosure complications, whereas Knox *et al.* (9) found an increase in complications with diverticular disease. The catabolic state of a patient with malignant disease may delay healing as may the infection associated with diverticular disease.

The statistical analysis strongly supports our conclusions that closure of a temporary colostomy prior to discharge of the patient could safely become a widely adopted procedure. We would add however two provisos. Firstly the need to resect the oedematous bowel ends in any early colostomy closure and secondly the importance of surgical expertise. This is an operation which should be performed or supervised by an experienced surgeon.

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## Notes on books

**Vascular Surgery. A Comprehensive Review** edited by W S Moore; 513 pages, illustrated; Grune & Stratton/Academic Press, London. £63.50.

This text is developed to accompany a postgraduate course designed to help candidates to prepare for the examination leading to Certification in General Vascular Surgery. The first examination for this was held in 1982 in the United States. The book, therefore, comprehensively considers anatomy, physiology and pathology of vascular diseases, followed by systematic consideration of problems in various parts of the body. Each chapter is written by a specialist. There are review questions at the end of the chapters.

**Seromyotomy for Chronic Duodenal Ulcer** by T Vincent Taylor. 64 pages, illustrated. Wolfe Medical, London. £12.

In the past it has been necessary to visit the originator of new techniques and although this remains the ideal, demonstration in a colour atlas is a worthwhile substitute. Mr Taylor describes it clearly with excellent colour photography and short textual captions and the end of the book gives simple easily read conclusions.

**Diagnostic Ultrasound in Gastroenterology** by L Bolondi, L Gandolfi and G Labo; 544 pages, illustrated; Piccin/Butterworths, London. £48.

This is an up-to-date review of ultrasonography including instrumentation, clinical problems and atlas coming from Bologna in Italy with language revision by L A Berger and C R Hill of London. The first chapters deal with the physical principles and technical aspects of ultrasound examination. Then come systematic chapters on liver, biliary system, pancreas, abdominal vessels and other abdominal organs. The last chapter is devoted to endoscopic ultrasonography.

**The Practical Management of Head Injuries** by J M Potter, with Michale Briggs. 100 pages, illustrated. Paperback. Lloyd-Luke, London. £5.00.

This fourth edition retains the original format of managing the patient in the emergency department and managing complications, convalescence and rehabilitation. It has been up-dated to include among other things consideration of the standardised Glasgow scale.